

REMARKS

Claims 1-38 were pending. Claims 1, 16 and 23 are amended. No Claims are canceled. No Claims are added. Accordingly claims 1-38 will be pending upon entry of the above amendment.

Claims 1, 9 and 33 were rejected under 35 U.S.C. § 102(b) as being anticipated by Moranne (GB 2073395). Claims 2, 3, 10-13, 15 and 34 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Moranne. Claims 4-8, 14, 16-32 and 35-38 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Moranne in view of XP'365.

Examiner Interview

Applicants thank the Examiner for his time and willingness to discuss this pending matter. A telephone interview was conducted with the Examiner to discuss the rejection of the claims as made in the outstanding Office Action. Applicants proposed amending the claims to better define the plate members of the heat exchanger as being made of titanium or a titanium-based alloy and Applicants proposed amending the claims to better define the braze material as a titanium-based braze material. The claim amendments proposed to the Examiner are those made above. While no specific agreement was reached, the Examiner agreed to consider the proposed amendments in view of the cited references.

Moranne (GB 2073395)

Moranne discloses a heat exchanger with plates made preferably from aluminum and fins made from stainless steel. See Moranne at page 2, lines 37-44. Moranne's only mention of a brazing method is by reference to French Patent 6,943,387 which requires dipping the part in zinc and brazing with aluminum braze filler.

Claims 1, 9 and 33 stand rejected under 35 USC 102(b) as being anticipated by Moranne. Independent claims 1 and 33 have been amended to require the plate members to be "made of titanium or a titanium-based alloy. Furthermore, claims 1 and 33 have been amended to require the braze material be a "titanium-based braze filler." Support for these amendments may be found in the original specification at, for example, paragraphs [022] and [023]. Moranne neither teaches nor fairly suggests a heat exchanger having plate members made of titanium or a titanium-based alloy and, further, does not teach or fairly suggest the use of a titanium-based braze filler.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1, 9 and 33 as being anticipated by Moranne.

Claims 2-3, 10-13, 15 and 34 stand rejected under 35 USC 103(a) as being unpatentable over Moranne. While not acquiescing to the merits of the Examiner's assertions as to what may be obvious to one of ordinary skill in the art, Applicants note that claims 2-3, 10-13 and 15 depend from and further limit claim 1. Furthermore, claim 34 depends from and further limits claim 33. As discussed above, claims 1 and 33 have been amended to overcome anticipation over Moranne and should be allowable. Dependent claims 2-3, 10-

13 and 15, as well as dependent claim 33, being dependent from and further limiting claims 1 and 33, should be allowable for that reason as well as for the additional recitations they contain.

In light of the above remarks, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 2-3, 10-13, 15 and 34 as being unpatentable over Moranne under 35 USC 103(a).

XP'365 Reference

The XP'365 reference refers to the article entitled "State of the Art of Titanium-Based Brazing Filler Metals" as was presented in Applicant's information disclosure statement. XP'365 discloses Ti-Zr-Cu-Ni fillers known to be particularly suitable for brazing heat exchangers made only of titanium. There is no suggestion, however, in XP'365 that the filler metal is suitable for anything other than titanium parent metal.

Claims 4-8, 14, 16-32 and 35-38 stand rejected under 35 USC 103(a) as being unpatentable over Moranne in view of XP'365. Each independent claim, as amended, requires three elements: 1) the plate materials to be made of titanium or a titanium-based alloy; 2) the fins be made of a material different from the plate materials; and 3) a titanium-based braze filler be used to join the plate materials with the fins. As discussed above, Moranne does not teach or suggest either a) the plate members being titanium or a titanium-based alloy; or b) the braze filler being a titanium-based braze filler. As further discussed below, XP'365 does not provide a teaching to overcome this deficiency in the teaching of Moranne.

XP'365 discloses the use of Ti-Zr-Cu-Ni filler to braze heat exchangers made only of titanium. Applicants take the position that certainly no one skilled in the art would consider using a Ti-Zr-Cu-Ni filler, which melts in the temperature range of about 1500° F to 1800° F, to braze aluminum (the material disclosed in the primary reference Moranne), which melts in the temperature range of about 1000° F to 1200° F. It is well established that a proposed modification to a primary reference used in a rejection under 35 USC 103 may not render that reference unsuitable for its intended purpose. In this case, if the braze filler of Moranne was replaced with the braze filler of XP'365, the temperature required to affect the braze would melt the materials used in the Moranne heat exchanger.

Moreover, Moranne does not teach or suggest using titanium for any material in the heat exchanger. If the teaching of titanium heat exchangers of XP'365 were used in Moranne (assuming, *arguendo*, that one would choose to **only** replace the plate members of Moranne with the titanium plate members of XP'365, although XP'365 does not suggest any benefit of making a heat exchanger using titanium only for the plate materials), the braze method of Moranne, if used to join titanium plate members with stainless steel or nickel fins, would result in a joint that was very brittle due to the formation of brittle titanium aluminide at the interface and, therefore, would have very low strength.

Furthermore, no one skilled in the art would be motivated to use Ti-Zr-Cu-Ni filler (as disclosed by XP'365) to braze the non-titanium based metals taught by Moranne. For each of the reasons noted above, and especially for the sum of the plurality of these reasons, Applicants respectfully submit that the references teach away from their combination to form Applicant's invention.

The Examiner states at page 5 of the office action, "it would have been obvious ... to have modified the heat exchanger of Moranne and substituted titanium for the light metal alloy material for the plate member with a reasonable expectation of success." (emphasis added) As shown above, one skilled in the art would not have any expectation of success for such a substitution.

The present invention claims the novel use of a non-titanium material fin (such as nickel or stainless steel) in a heat exchanger having a plate material made of titanium or a titanium-based alloy and brazing these components together with a titanium-based filler. Prior to Applicant's invention, it was not obvious that titanium based braze filler would wet and bond to the stainless steel or nickel fins, and it was not obvious that the resulting joint would not crack due to the difference in thermal expansion of the base metals and braze filler. Furthermore, it was not obvious that the resultant joint would provide useful engineering properties. While brazing is particularly useful for joining dissimilar metals, those skilled in the art know that compatibility of braze filler and parent metal is one of the key elements in forming a good brazed joint.

For the above reasons, Applicants respectfully submit that neither Moranne nor XP'365, nor any teachings for which both Moranne and XP'365 may be properly combined under the guidance of 35 USC 103, teach or fairly suggest the apparatus and method as claimed. Reconsideration and withdrawal of the rejection of claims 4-8, 14, 16-32 and 35-38 is requested.

CONCLUSION

Applicant again would like to thank the Examiner for taking the time to discuss the proposed amendments in a telephone interview. Reconsideration and withdrawal of the Office Action with respect to claims 1-38 are requested.

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Applicant submits that claims 1-38 are now in condition for allowance. Early notice to that end is earnestly solicited.

In the event that the examiner wishes to discuss any aspect of this response, please contact the attorney at the telephone number identified below.

Respectfully submitted,

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